BOOK REVIEW

Low Energy Electron Spectrometry

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The preface of the book defines its scope and contents. It is a comprehensive single-volume treatise providing extensive coverage to diverse fields of electron spectrometric research. "Low energy" is a relative term which embraces different ranges in different fields as exemplified in Fig. 1 of Chapter 1. However, except for the Auger effect and internal conversion this book deals mostly with electron spectrometric research topics at energies below 50 kev.

The general treatment can be classified into two main subject areas :

(1) electron spectrometry; and

(2) topics of atomic physics like Auger, Coster-Kronig auto-ionization effects, internal conversion of nuclear transitions work related to atomic recoil following α-decay, natural widths of atomic levels, atomic electron binding energies and electron energy losses due to scattering in solids.

The book begins with a brief introduction in Chapter 1, which indicates the purpose of the book and the energy ranges of interest for the measurement and analysis of electron spectra. It is classified into eight chapters supplemented by eight appendices, encompassing a wide range of topics in the fields of electron spectrometry, X-ray spectroscopy, electron microscopy and nuclear physics.

Chapter 2 deals with instrumentation and detection techniques. In this chapter the various types of instrumentation that give high energy or momentum resolving power ($\lesssim 0{\cdot}1\%$) are reviewed. These comprise two main subdivisions : magnetic and electrostatic spectrometers. Information with significant bearing on electron spectrometry at low energies is dealt with in this chapter. However, the treatment of detectors is mostly elementary and descriptive, which is perhaps compensated by copious references to original literature. The electron sources as a topic of specific treatment has been purposely omitted.

Chapter 3 embodies Auger and Coster-Kronig effects and auto-ionization. It deals with electron emission rearrangement transitions in initially excited atoms. The angular distribution of Auger electrons and various other applications of Auger effect have been discussed exhaustively.

Chapter 4 concerns internal conversion with special emphasis on its atomic aspects viz., the study of the distribution of the various orbital electrons throughout the atom. The effects of electron density near the nucleus which can influence such processes as isomer shift and nucleus-atomic reactions are also discussed.

In Chapter 5 are treated nuclear recoil after α-decay, its effects on internal conversion electron line structures, and applications of its effect in studying changes in binding energies due to multiple ionization.

Chapter 6 surveys the subject of atomic level widths as measured by electron spectrometric and other methods of investigation. The factors that contribute to the widths of atomic levels as obtained from X-ray and conversion and photoelectron spectrum have also been elaborately enumerated.

Chapter 7 attempts to give a broad treatment and review of the subject of atomic electron binding energies as measured for atoms in both the gaseous and solid states, with methods of electron spectrometry, X-ray and ultraviolet spectroscopy, electron scattering measurements, and so on. Also discussed here are alterations of atomic electron binding energies as resulting from changes in the chemical or physical states of elements of interest.

Chapter 8 treats electron scattering in solids. Here, high resolution electron energy loss measurements have been combined with electromagnetic radiation absorption and neutron scattering methods for the exploration of the nature of plasmon, exciton and phenon excitations.

Finally, there are appendices containing information of special value to the electron spectrometrist, as well as to workers in allied fields.

The book provides wealth of information in the field of electron spectrometry and should be very useful as a source of descriptive materials and references to workers engaged in research in a variety of fields.

S.D.C.